

### IN THE SPECIFICATION

The paragraph beginning at page 6, line 26 is amended as follows:

FIG. 21 is a schematic illustration of an example of a list of points along a calculated centerline where the line passing through them describes an angle  $[\theta_v]$ .

The paragraph beginning at page 24, line 9 is amended as follows:

At 906, topological violations are optionally eliminated (unless, for example, it is desired to extract an entire vessel tree, in which case elimination of topological violations is not performed). One example of a topological violation is a Y-shaped centerline condition, such as is illustrated schematically in FIG. 21. Y-shaped centerline conditions may occur when the seed 2101 is ambiguous (such as near a bifurcation in the vessel). In such a case, the endpoints of the centerline may be located in different branches of the vessel. Detecting this condition involves finding the angle  $[\theta_s]$  subtended at the seed 2101 by the vectors from the seed 2101 to points on the centerline that are located a few extracted incremental segments away from the seed, as shown in FIG. 21 at 2103 and 2104. If the value of the angle 2102 is below a certain threshold  $[\theta_{min}]$ , then the propagation has resulted in a Y-shaped centerline.

The paragraph beginning at page 25, line 1 is amended as follows:

In one example, the threshold  $[\theta_{min}]$  is predetermined, such as to a default value, but which may vary (e.g., using a lookup table or a stored human body atlas), such as using a user-specified parameter identifying the vessel of interest or identifying the actual value of the threshold  $[\theta_{min}]$ .

The paragraph beginning at page 29, line 12 is amended as follows:

The vessel departure check uses a cylindrical model of the vessel, which is completely characterized by its radius ( $r$ ) and height ( $h$ ). The approximate diameter of the vessel at the seed is estimated at **1502** using Principal Component Analysis (PCA). The maximum geodesic distance increases monotonically after every update and is approximately equal to one half the height of the cylinder (i.e.,  $h=2 \cdot d_{\max}$ ). At **1503**, vessel departure occurs when the rate ( $R$ ) at which the height increases falls below a predetermined threshold ( $R_{\min}$ ). The rate  $R$  is the ratio of the increase in maximum geodesic distance  $[\Delta d_{\max}]$  and the front iteration interval  $[\Delta i]$  over which the increase has been observed. In one example, the iteration interval is calculated adaptively based on the current value of  $d_{\max}$  and the total number of updates:

$$\text{Interval } [\Delta i] = N_u = N_c - N_f$$

where  $N_u$  is the number of unfilled voxels in the cylinder,  $N_c$  is the estimated total number of voxels in the cylinder and  $N_f$  is the number of filled voxels.  $N_f$  is given by the total number of iterations and  $N_c$  is calculated as:

$$N_c = \text{Volume of cylinder} / \text{Volume per voxel}$$

$$\text{Volume of cylinder} = 2\pi^2 d_{\max}$$

**PRELIMINARY AMENDMENT**

Serial Number: 10/723,445

Filing Date: November 26, 2003

Title: SYSTEM AND METHODS FOR SEGMENTING AND DISPLAYING TUBULAR VESSELS IN VOLUMETRIC IMAGING DATA

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Docket No: 543.011US1

Conclusion

Applicant respectfully requests that the preliminary amendment described herein be entered into the record prior to examination and consideration of the above-identified application. Applicant submits that this amendment merely corrects typographical errors in printer font recognition and does not introduce new matter.

Respectfully Submitted,

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CERTIFICATE UNDER 37 CFR § 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelop addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 4 day of November 2004.

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